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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,276	01/14/2002	Goro Nakatani	040894-5755	4701

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EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/043,276

Applicant(s)

NAKATANI ET AL.

Examiner

Junghwa M. Im

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) 5-7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 1-4 in Paper No. 7 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a metal interconnect layer as an upper layer of the silicon nitride film which is dielectric.

Claims 2-4 are dependent on the rejected base claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over M'Saad et al.(US 6,399,489), hereafter M'Saad in view of Buynoski et al. (US 6,207,553), hereafter, Buynoski.

Regarding claim 1, Figure 2 of M'Saad shows semiconductor device comprising: an interconnect layer (240, 242, 244) arranged above a substrate on which a functional semiconductor region (203, 206) is formed, an inter layer dielectric (a bottom layer of 227, 228, 229, more specifically a silicon oxide layer as taught in col.1, line 21) covering a surface of the interconnect layer, and a silicon nitride film formed over a surface of said interlayer dielectric (col. 1, lines 20-44 and col. 16, lines 1-6), a metal interconnect layer (246) as an uppermost metal layer formed over said silicon nitride film and a planarized dielectric (230, and col.12, line 8) formed on said metal interconnect layer.

M'Saad does not teach the uppermost metal layer is consisted of gold. However, Buynoski teaches a uppermost metal layer in Figure 1 is made of gold (col. 2, lines 4-8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Buynoski to the top metal layer of M'Saad since a uppermost layer made of gold increases the conductivity and mechanical strength of the interconnection layer.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over M'Saad and Buynoski as applied to claim 1 above, and further in view of Chakravorty et al. (US 5,149,615), hereafter Chakravorty.

Regarding claim 2, M'Saad does not explicitly disclose a polyimide layer for covering the uppermost metal layer. However, Figure 10 of Chakravorty teaches a planarized top dielectric (58) is consisted of polyimide.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify a dielectric layer over the top metal layer of M'Saad with the teaching of

Chakravorty since the a dielectric layer made of polyimide improves to level out any non-planar irregularities in a layer as taught in the reference.

Regarding claim 3, M'Saad teaches the silicon nitride film is formed by high-density plasma CVD method (col. 14, lines 16-18).

In addition, "high-density plasma CVD" is a process designation, and would thus not carry patentable weight in this claim drawn to a product. See *In re Thorp*, 227 USPQ 964 (Fed. Cir. 1985).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over M'Saad and Buynoski as applied to claim 1 above, and further in view of Huang et al. (US 6,084,304), hereafter Huang.

Regarding claim 4, M'Saad does not explicitly teach an opening in the polyimide layer for bonding wire connection. However, Figure 2E of Huang teaches a conductive opening 25 is patterned through the passivation layer 24 and the exposed portions of the top metal layer 22.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Huang to the device of M'Saad in order to have an opening in the top dielectric layer since the opening is used to connect to an external bonding pad through the top metal layer as taught in col. 2, lines 49-63.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JMI
March 10, 2003


Sara Crane
Primary Examiner